

**REMARKS**

Applicant provides the following amendment in response the Office Action of February 3, 2006. The specification has been amended to delete material as required by the examiner. Claims 11, 19 and 25 have been amended. No new matter has been introduced by these amendments.

Rejection under 35 USC 112, first paragraph

The examiner has rejected Claims 19 and 25 under 35 U.S.C. §112, first paragraph as failing to comply with the enablement requirement. The examiner states that Claims 19 and 25 the abbreviation “ccm” is not described in the instant specification as to what its definition is nor is “ccm” well known in the art as to what its meaning or definition is.

Applicants respectfully disagree. The abbreviation “ccm” is an abbreviation for “cubic centimeters per minute”, which is a well-known measurement of flow rate. The specification and claims clearly state that the method applies a gas at a specified *linear flow rate*, with “ccm” being the measurement of that linear flow rate. (see page 4, line 1 and claim 1). The use of the abbreviation “ccm” as a measurement of flow rate is wide spread. Enclosed is a portion of a U.S. Government report from the Department of Energy (table of contents and abbreviations/acronyms sections). This U.S. Government report defines “ccm” as “cubic centimeter per minute”. Additionally, numerous U.S. patents have used the abbreviation in the claims without further definition within the specification. Additionally, many manufacturers of gas flow controller equipment use “ccm” as the unit of measurement for their apparatus. Copies of specifications for such equipment are enclosed. Applicants have submitted a supplemental IDS for these supporting materials. Applicants respectfully submit that the examiner’s rejection has been overcome and respectfully request reconsideration.

Rejection under 35 USC 112, first paragraph

The examiner has rejected Claims 19 and 25 under 35 U.S.C. §112, first paragraph as failing to comply with the enablement requirement. The examiner states that Claims 19 and 25 the abbreviation “ccm” is indefinite as to what this abbreviation or symbol is or stands for as it is not known in the art nor is it defined in the instant specification.

Applicants respectfully disagree. The abbreviation “ccm” is an abbreviation for “cubic centimeters per minute”, which is a well-known measurement of flow rate. The specification and claims clearly state that the method applies a gas at a specified *linear flow rate*, with “ccm” being the measurement of that linear flow rate. (see page 4, line 1 and claim 1). The use of the abbreviation “ccm” as a measurement of flow rate is wide spread. Enclosed is a portion of a U.S. Government report from the Department of Energy (table of contents and abbreviations/acronyms sections). This U.S. Government report defines “ccm” as “cubic centimeter per minute”. Additionally, numerous U.S. patents have used the abbreviation in the claims without further definition within the specification. Additionally, many manufacturers of gas flow controller equipment use “ccm” as the unit of measurement for their apparatus. Copies of specifications for such equipment are enclosed. Applicants have submitted a supplemental IDS for these supporting materials. Applicants respectfully submit that the examiner’s rejection has been overcome and respectfully request reconsideration.

Rejection under 35 U.S.C. §103(a)

The examiner has rejected Claims 11, 17, 18, 19, 23, 24, and 25 under 35 U.S.C. §103(a) as being unpatentable over Thome ‘707 in view of either Nishihara ‘181 or the Chemical Principles reference to show statement of fact. The examiner states that “Tome suggests the process of heating a metal oxide, eg. V<sub>2</sub>O<sub>5</sub> at 550 °C for about 8 hours in a flowing gas mixture of air and water vapor at what appears to be the instantly claimed flow rate, since it is not clear what the abbreviation “ccm” is or stands for then cooling the metal oxide. The metal oxide appears to have the instantly claimed surface area; in any event the size of an article ordinarily is not a matter of invention.”

Applicants respectfully disagree. To establish a prima facie case of obviousness, “[t]here must be some reason, suggestion, or motivation found in the prior art whereby a person of ordinary skill in the field of the invention would make the combination.” In re Oetiker, 977 F.2d 1443, 1447 (Fed. Cir. 1992.) Applicants respectfully submit that the examiner has not established a prima facie case of obviousness. One skilled in the art of preparing metal oxides with increased specific capacity would find no suggestion, either in Thome or the Nishihara ‘181 or the Chemical Principles, to combine the references to arrive at the present invention. Thome discloses a method of preparing vanadium pentoxide. Thome discloses a method of producing a pure form of  $V_2O_5$ , from a precursor, not a method of introducing defects in existing  $V_2O_5$  or other metal oxides for the purpose of preparing a metal oxide for use as a battery cathode with increased capacity, as the presently claimed invention does. Thome discloses the introduction of “fresh air” to the precursor for the purpose creating  $V_2O_5$ . Thome does not teach exposing  $V_2O_5$  to “fresh air”. Additionally, Thome does not teach that this “fresh air” will introduce defects in the  $V_2O_5$  which prepares the metal oxide for use as a battery cathode with increased capacity. Rather, Thome teaches a method of preparing purer  $V_2O_5$ , which teaches against the purposefully introduced defects into the metal oxide of the present invention. There is no reason, suggestion, or motivation in Thome to combine it with the teaching of either Nishihara or the Chemical Principles reference to arrive at the present invention.

Nishihara ‘181 or the Chemical Principles do not provide the necessary reason, suggestion, or motivation whereby a person of ordinary skill in the field of the invention would make the combination. The examiner has stated that the Nishihara reference provides that “air itself contains water vapor”. There is no reason, suggestion, or motivation in Nishihara to combine water vapor in the air with the vanadium oxide of Thome to arrive at the present invention. Similarly, the Chemical principals reference merely states that the composition of the atmosphere contains water vapor. There is no reason, suggestion, or motivation in the Chemical Principles reference to combine water vapor with the method of Thome to arrive at the present invention, preparing a metal oxide for a battery cathode with increased capacity. No discussion of either batter cathodes or their capacity is

provided in either reference. Applicants respectfully submit that the examiner's has not presented a *prima facie* case of obviousness and respectfully request withdraw of the rejection.

Additionally, Thome '707 provides for a flow rate of about 0.2 and about 0.6 cubic meters of air per hour. (see Col. 7, table 2, Claim 11, and Col. 5, lines 18 – 21,). This converts, using the 15 cubic meters/hour and 22 cubic meters/hour amounts stated in Table 2, to 1,042,045,457,500,000.1 ccm and 1,528,333,337,666,666.7 ccm, respectively. This rate does not fall within the rate claimed in the instantly claimed flow rate. Thus, Tome neither teaches nor discloses the invention as claimed. Applicants respectfully submit that the examiner's rejection has been overcome and respectfully request withdraw of the rejection.

Claims 11, 19, and 24 were rejected under 35 USC §103(a) as being unpatentable over Howard '477 in view of either Nishihara '181 or the Chemical Principles reference. The examiner states Howard suggests the process of heating a metal oxide sample, eg,  $\text{LiMn}_2\text{O}_4$ , in flowing air at the instantly claimed flow rate, since it is not clear what the abbreviation "ccm" is or stands for. Air contains water vapor or  $\text{H}_2\text{O}$  gas according to Nishihara and the Chemical Principles reference. The metal oxide appears to have the instantly claimed surface area; in any event the size of an article ordinarily is not a matter of invention.

Applicants respectfully submit that the examiner's has not presented a *prima facie* case of obviousness and respectfully request withdraw of the rejection. Howard teaches an intercalation composition and a method for making such. An intercalation composition is one where a molecule (or group) is included between two other molecules (or groups). The host usually has some periodic network. Howard teaches the use of a spinel structure and the molecule included is a trivalent metal cation that adapts to the spinel structure in place of manganese. (see col 3 line 57 – col. 4 line 23). There is no reason, suggestion, or motivation in the Howard reference to combine an intercalation composition and a method for making such with the water vapor disclosed in the Nishihara and the Chemical Principles reference to arrive at the present invention, preparing a metal oxide for a battery cathode with increased capacity. No discussion of either batter cathodes or their capacity is

provided in either reference. Applicants respectfully submit that the examiner's has not presented a *prima facie* case of obviousness and respectfully request withdraw of the rejection.

Additionally, Howard '477 discloses a flow rates of 2-3 cubic foot/hour and 2-3 cubic foot/minute (see examples). Converted to ccm (cubic centimeters per minute) these rates do not fall within the rate claimed in the instantly claimed flow rate. Thus, Howard neither teaches nor discloses the invention as claimed. Applicants respectfully submit that the examiner's rejection has been overcome and respectfully request withdraw of the rejection.

2 cubic foot/hour = 943.894 9 cubic centimeter/minute

2 cubic foot/minute = 56 633.694 cubic centimeter/minute

3 cubic foot/hour = 1 415.842 35 cubic centimeter/minute and

3 cubic foot/minute = 84 950.541 cubic centimeter/minute.

Claims 11, 17, 19, 23, and 24 have been rehected under 35 U.S.C. 103(a) as being unpatentable over Chambers '005. The examiner states that "Chambers suggests the process of heating a sample of  $V_2O_5$  at 500° C in a stream of air saturated with water vapor, ie., flowing gas mixure of  $O_2$  and  $H_2O$ , at or overlapping the instantly claimed flow rate, since it is not clear what the abbreviation "ccm" stands for. See Col. 4, and example 1."

Applicants respectfully submit that the examiner's has not presented a *prima facie* case of obviousness and respectfully request withdraw of the rejection. There is no reason, suggestion, or motivation in the Chambers reference to apply a mixture of  $O_2$  and  $H_2O$  gas to a metal oxide to produce a defective metal oxide. Chambers teaches a method of separating vanadium from vanadium bearing material. Chambers teaches the use of raw material, such as "titanium slag" (see example 1) and extracting from it pure vanadium. Chambers neither teaches nor discloses the

present invention, a process for preparing a metal oxide for a battery cathode with increased capacity. A method of extracting  $V_2O_5$  from raw materials provides no reason, suggestion, or motivation to produce the defective metal oxide of the present invention. Applicants respectfully submit that the examiner's has not presented a *prima facie* case of obviousness and respectfully request withdraw of the rejection.

The examiner has rejected claims 11, 17, 18, 20-22 and 24 under 35 U.S.C. 103(a) as being unpatentable over Shizuka '637 in view of either Nishihara '181 or the Chemical Principles reference. The examiner stated "Shizuka suggests the process of heating a metal oxide, e.g.  $Mn_2O_3$ ,  $Co_3O_4$ , in air to 500°C for 6 hours at a rate of 5°C/min and then cooling the metal oxide to room temperature, ie. ambient, at a rate of 5°C/min. [...] See examples 1-4. Air contains water vapor, ie,  $H_2O$  gas. See Nishihara, Col. 2, line 23 and the Chemical Principles reference.

Applicants respectfully disagree. To establish a *prima facie* case of obviousness, "[t]here must be some reason, suggestion, or motivation found in the prior art whereby a person of ordinary skill in the field of the invention would make the combination." Shizuka introduces a molecule into a spinel structure. All of Shizuka's examples include several starting materials that are blended. A metal oxide is one of the several starting materials (see col. 6, line 41, and examples). The starting materials are blended and calcined to create a new material with a different chemical composition than any of the starting materials. The present invention has one starting material, a metal oxide, that is treated with a mixture of gas under heat, and results in a metal oxide having defects as a result of the treatment. The specification states on page 8, lines 11-12, "Heating bulk [metal oxide] under  $O_2$ ,  $O_2/H_2O$ , and Ar causes no long term change to the long-range structure of the metal oxide, but it significantly affects the [metal oxide] lithium capacity." There is no reason, suggestion, or motivation in the Shizuka reference to suggest that treating just one of the three starting materials of Shizuka would result in a defective metal oxide with increased capacity, as

claimed in the present invention. Applicants respectfully submit that the examiner's has not presented a prima facie case of obviousness and respectfully request withdraw of the rejection.

In view of the above amendment and remarks, applicant believes the pending application is in condition for allowance.

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Respectfully submitted,

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